Fiber couplers are widely used in telecommunications and industry as passive splitting power devices. The effective power coupling and transmission from one fiber to another is mainly determined by both the coupling length and the coupling coefficient. The coupling length can be calculated directly but the coupling coefficient depends upon the refractive index and the separation fiber axis. After the fusion processes of two SMF-28e® couplers, the refractive index is unknown due to a change in the radius of the fiber (r_{cladd} < 40 µm and r_{core} < 1.5 µm). The coupling coefficient range is obtained from a distribution of the coupling ratio and compared with the empirical formula, which also enables one to calculate the refractive index. In this experiment, the coupling coefficient in the range of 0.6–0.9/mm is calculated as a function of the separation fiber axis and the refractive index of the core and cladding. The result shows a good correlation between experimental results and theoretical calculation.